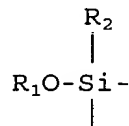


WE CLAIM:

1. In a coating composition vapor for the  
pyrolytic deposition of silicon dioxide comprising a carrier  
gas, a source of oxygen and a silicon compound, the  
improvement wherein said composition comprises at least one  
silicon compound comprising:



wherein  $R_1$  is selected from the group consisting of  
alkyl and substituted alkyl radicals having from one to 10  
carbon atoms; alkenyl and substituted alkenyl radicals having  
from 2 to 10 carbon atoms; alkynyl and substituted alkynyl  
radicals having from 2 to 10 carbon atoms; aryl, aralkyl,  
substituted aryl and substituted aralkyl radicals having from  
6 to 11 carbon atoms; and

$R_2$  is selected from the group consisting of  
hydrogen; halogen; alkenyl and substituted alkenyl radicals  
having from 2 to 10 carbon atoms; halogenated alkyl and  
perhalogenated alkyl radicals having one to 10 carbon atoms;  
alkynyl and substituted alkynyl radicals having from 2 to 10  
carbon atoms.

2. The composition of claim 1, wherein said alkyl  
or substituted alkyl radicals have from 1 to 4 carbon atoms;  
said alkenyl or substituted alkenyl radicals have from 2 to 4  
carbon atoms; said alkynyl or substituted alkynyl radicals  
have from 2 to 4 carbon atoms; and said aryl, aralkyl,  
substituted aryl and substituted aralkyl radicals have from 6  
to 9 carbon atoms.

09057677-040999

3. The composition of claim 2, wherein said alkyl or substituted alkyl radicals are selected from the group consisting of  $-\text{CH}_3$ ,  $-\text{CH}_2\text{CH}_2\text{CH}_3$ ,  $-\text{CH}_2\text{CH}_2\text{-OH}$ ,  $-\text{CCl}_3$ ,  $-\text{CH}_2\text{CHClCH}_3$  and  $-\text{CH}_2\text{CCl}_2\text{CCl}_3$ ; said alkenyl or substituted alkenyl radicals are selected from the group consisting of  $-\text{CH=CHCH}_3$  and  $-\text{CH=CH}_2$ ; said alkynyl or substituted alkynyl radicals are selected from the group consisting of  $-\text{C}\equiv\text{C-CH}_3$  and  $-\text{C}\equiv\text{CH}$ ; and said aryl, aralkyl, substituted aryl or substituted aralkyl radicals are selected from the group consisting of  $-\text{C}_6\text{H}_5$  and  $-\text{C}_6\text{H}_4\text{CH}_3$ .

4. The coating composition of claim 1, wherein said halogen is chlorine; said alkenyl or substituted alkenyl radical comprises from 2 to 4 carbon atoms; said halogenated, perhalogenated or substituted alkyl radical comprises from 1 to 4 carbon atoms; and said alkynyl or substituted alkynyl radical comprises from 6 to 9 atoms.

5. The coating composition of claim 4, wherein said alkenyl or substituted alkenyl radical is selected from the group consisting of  $-\text{CH=CHCH}_3$  and  $-\text{CH=CH}_2$ ; said halogenated, perhalogenated or substituted alkyl radical is selected from the group consisting of  $-\text{CCl}_3$ ,  $-\text{CH}_2\text{CHClCH}_3$  and  $-\text{CH}_2\text{CCl}_2\text{CCl}_3$ ; and said alkynyl or substituted alkynyl radical is selected from the group consisting of  $-\text{C}\equiv\text{CH}_3$ ,  $-\text{C}\equiv\text{C-CH}_3$  and  $-\text{CH}_2\text{C}\equiv\text{CH}$ .

09057677-040998

6. A coating composition vapor according to claim 1, wherein said compound has the formula

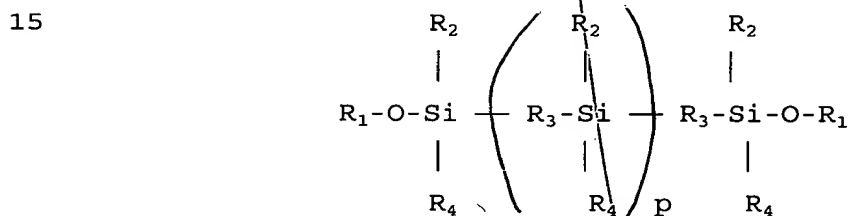


10            wherein  $R_3$  and  $R_4$  are independently selected from the group consisting of alkyl and substituted alkyl radicals having from one to 10 carbon atoms; alkenyl and substituted alkenyl radicals having from 2 to 10 carbon atoms; alkynyl and substituted alkynyl radicals having from 2 to 10 carbon atoms; 15 aryl, aralkyl, substituted aryl and substituted aralkyl radicals having from 6 to 11 carbon atoms; hydrogen; halogen; -CN; -OCN; phosphine; alkylphosphines and dialkylphosphines wherein the alkyl radical has from 1 to 10 carbon atoms.

20            7. The coating composition of claim 6, wherein said compound is selected from the group consisting of trichloroethoxysilane, trichloropropoxysilane, ethoxysilane, chloroethoxysilane, dichloroethoxysilane, tri- (trichloromethyl)ethoxysilane, di- 25 (pentachloroethyl)ethoxysilane, di- (trichloromethyl)ethoxysilane, tri- (pentachloroethyl)ethoxysilane, pentachloroethylethoxysilane, trichloromethylethoxysilane, trichloromethylpropoxysilane, trichloromethyldichloroethoxysilane, 30 pentachloroethylchloroethoxysilane, dimethylmethoxysilane, dimethylchloromethoxysilane, trichloromethoxysilane, tetramethyldisiloxane, tetramethyldichlorodisiloxane.

09057677-040998

8. A coating composition vapor according to claim 1, wherein said compound has the formula selected from the group consisting of:



20 wherein m is from 2 to 7; p is from 0 to 7; R<sub>3</sub> is independently selected from the group consisting of

25 -S-; -P- and -N-; -O-; and -(CH<sub>2</sub>)<sub>n</sub>

wherein n is 1 to 10; and R<sub>4</sub> is independently selected from the group consisting of alkyl and substituted alkyl functional groups having from one to 10 carbon atoms; alkenyl and substituted alkenyl functional groups having from 2 to 10 carbon atoms; alkynyl and substituted alkynyl functional groups having from 2 to 10 carbon atoms; aryl and substituted aryl functional groups having from 6 to 11 carbon atoms; hydrogen; halogen; -CN; -OCN; phosphine and substituted phosphines.

09057677-040998

9. The coating composition of claim 1, further comprising an accelerant to increase the deposition rate of silicon dioxide.

5

10. The coating composition of claim 9, wherein said accelerant is selected from the group consisting of trivalent compounds of nitrogen, phosphorus and boron.

10

11. The coating composition of claim 10, wherein said accelerant is selected from the group consisting of triethylphosphite, trimethylphosphite, trimethylborate,  $\text{PCl}_3$ ,  $\text{PBr}_3$ ,  $\text{BCl}_3$ ,  $\text{BF}_3$ , and  $(\text{CH}_3)_2\text{BBr}$ .

15

12. The coating composition of claim 9, wherein said accelerant is selected from the group consisting of pentavalent compounds of phosphorus.

20

13. The coating composition of claim 12, wherein said accelerant is selected from the group consisting of  $\text{PF}_5$  and  $\text{PCl}_5$ .

25

14. The coating composition of claim 9, wherein said accelerant is selected from the group consisting of tetravalent compounds of sulfur and selenium.

15. The coating composition according to claim 9, wherein the accelerant is ozone.

30

16. The composition of claim 9, wherein the accelerant is a compound of a metal selected from the group consisting of manganese, cobalt, iron, nickel, copper, zinc, strontium, cadmium, lead, aluminum, scandium, chromium, gallium, arsenic, yttrium, indium, antimony, bismuth, titanium, germanium, zirconium, tin.

35

09057677-040998

17. The composition of claim 16, wherein said  
accelerant is selected from the group consisting of metal  
organic compounds, metal halide compounds and metal compounds  
5 containing a combination of organic and halogen functional  
groups.

18. The composition of claim 9, wherein said  
accelerant is a Lewis Acid.

10

19. The composition of claim 18, wherein said  
Lewis acid is selected from the group consisting of  
trifluoroacetic acid, hydrochloric acid, acetic acid and  
formic acid.

15

20. The composition of claim 9, wherein said  
accelerant is a Lewis Base.

21. The composition of claim 20 wherein said Lewis  
20 base is selected from the group consisting of NaOH, NaF,  
methanol, methyl ether and ethylthioether.

22. The composition of claim 9, wherein said  
accelerant is water.

25

23. The composition according to claim 1, further  
comprising a metal-containing compound vapor comprising a  
metal, M, other than silicon.

24. The composition of claim 23, wherein said  
30 compound has the formula  $M(R_{22})_q$ , wherein q is the valence of M  
and  $R_{22}$  is selected from the group consisting of organic and  
halide radicals.

09057677.040998

25. The composition of claim 24, wherein M is selected from the group consisting of tin, titanium, tungsten and antimony.

5           26. The composition according to claim 25, wherein said metal-containing compound is an organotin compound.

          27. The composition according to claim 26, wherein said tin compound has the structural formula  $\text{Sn}(\text{R}_{22})_4$  wherein  
10 each  $\text{R}_{22}$  is independently selected from the group consisting of halogen, alkyl, aryl and acetylacetonate radicals.

          28. The composition according to claim 27, wherein at least one  $\text{R}_{22}$  is a halogen and at least one  $\text{R}_{22}$  is an alkyl  
15 radical having from 1 to 10 carbon atoms.

          29. The composition according to claim 28, wherein at least one  $\text{R}_{22}$  is chloride and at least one  $\text{R}_{22}$  is an alkyl  
radical having from 1 to 4 carbon atoms.

20           30. The composition according to claim 29, wherein said organotin compound is monobutyltin trichloride.

          31. The composition of claim 23, further  
25 comprising an accelerant to increase the deposition rate of silicon oxide.

          32. The composition of claim 31, wherein said accelerant is selected from the group consisting of water;  
30 ozone; Lewis acid; Lewis basis; trivalent compounds of nitrogen, phosphorus and boron; tetravalent compounds of sulfur and selenium; pentavalent compounds of phosphorus; and

09057677 04099

metal compounds of the formula  $M(R_{22})_q$  wherein M is selected from the group consisting of manganese, cobalt, iron, nickel, copper, zinc, strontium, cadmium, lead, aluminum, scandium, chromium, gallium, arsenic, yttrium, indium, antimony, bismuth, titanium, germanium, zirconium and tin, q is the valence of M, and  $R_{22}$  is selected from the group consisting of halogen, alkyl, aryl and acetylacetonate radicals.

09057677 040998